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## *The spectralism of Gérard Grisey: from the nature of the sound to the nature of listening<sup>1</sup>*

**ABSTRACT:** The paper is an attempt to consider Grisey's music from an ontological perspective, not only as a cultural product, but above all as an entity derived from the order of nature.

The spectral music, as an entity derived from the order of nature, may be studied primarily as mental reality that refers directly to the composer's stance, physical reality, that refers to the material from which the music is produced, and psychological reality of relating to its perception.

In Grisey's creative attitude, one distinguishes several tendencies. The article describes treating sound as a living organism in time, replacing the idea of *timbre-matière*, from the traditional art of orchestration, with *timbre-son*, based on the science of acoustics, a processual approach to time and form, taking account in the creative process of human perceptual abilities and seeking a musical language based on scientific premises. These tendencies are described in the context of the composer's statements and examples of his work. Taking the nature of sounds as his starting point, Grisey headed towards the nature of listening, and the effects of this journey are his clearly specified views and their manifestation in composed musical works.

**KEYWORDS:** spectral music, Grisey, sound, timbre, time

An increasing amount of attention and space is currently being devoted in Polish musicological publications to the spectral music and oeuvre of Gérard Grisey<sup>2</sup>. Last year, in particular (the tenth anniversary of the composer's death), brought many texts dealing with the significance of his music in the historical context (as a technical-aesthetic proposition of the twentieth century) and the now current context of post-spectral music.

The present paper considers Grisey's music from an ontological perspective, not only as a cultural product, but above all as an entity derived from the order of nature.

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<sup>1</sup> Polish orig., 'Spektralizm Gerarda Griseya: od natury dźwięku do natury słuchania', *Res Facta Nova* 11/20 (2010), in press.

<sup>2</sup> See, for instance, *Res Facta Nova* 11/20 (2010), in press.

All music can be considered from an ontological perspective on three planes. One plane is delineated by the communicational function of music and three points of reference connected with that function: the composer's idea, the score and the transmission. The composer's idea is directly linked to his oeuvre and is characterised either by an intuitive approach, or else by a scientific approach, in which genuine knowledge about reality is acquired through scientific cognition based on the concrete results of research in particular scientific disciplines. The score, which contains only an approximate notation of the composer's idea, represents a neutral level of the communicational function. The transmission, meanwhile, which occurs in the performance of music, leads directly to the addressee of the communication: the listener. The second plane is determined by the consideration of music as sign. Located on this plane are the expression of music through graphic symbols (notes, lines, additional graphic signs, etc.), the meaning of graphic symbols discovered when, for example, harmonic analysis imparts specific harmonic functions to notes, and the content of music cognised, for example, through the decoding of a sequence of harmonic functions, which enables a particular sense (content) of that sequence to be discovered. Finally, the third plane is formed by the various realities accessible to sensory cognition: the mental, expressed in the works of composers; the physical, shaped through sounds; the psychic, shaped by the listening receiver of music. These three planes form a three-dimensional space in which music exists, and the points of reference on the particular planes are linked to one another.

If we take into account the fact that nature is 'the world accessible to sensory cognition (objective reality [...])'<sup>3</sup> and 'a set of features characteristic of a given group of phenomena, objects, etc.; the character, kind, essence of something [...]'<sup>4</sup>, then spectral music, as an entity derived from the order of nature, may be studied primarily within the context of the plane of reality on which mental reality refers directly to the composer's stance, physical reality to the material from which the music is produced, and psychic reality to its perception, whilst the set of features characteristic of the material and the perception of spectral music confirms the need to consider it as an entity derived from the order of nature.

In order to demonstrate the naturalistic provenance of spectral music, we must examine in particular – within the context outline above – the composer's attitude, which determines the mental reality. In Grisey's creative attitude, one distinguishes several tendencies, including the following:

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<sup>3</sup> See 'natura', in *Słownik wyrazów obcych* [Dictionary of foreign terms], ed. Jan Tokarski (Warsaw, 1980), 502.

<sup>4</sup> Ibid.

1. treating sound as a living organism in time;
2. replacing the idea of *timbre-matière*, from the traditional art of orchestration, with *timbre-son*, based on the science of acoustics<sup>5</sup>;
3. a processual approach to time and form;
4. taking account in the creative process of human perceptual abilities;
5. seeking a musical language based on scientific premises.

In the 1970s, Grisey noted the growing interest in the physical form of the sound. He initially considered the meaning of the notions which refer to certain configurations of sounds, such as octave, minor third or dissonance.<sup>6</sup> He was aware from the very beginning that some sounds are more complex than others. The use of sounds from outside equal temperament, for example, led the composer to employ microintervals, the application of which he treated not as an expansion of the 12-note scale to a 24-note scale, but only as a necessity dictated by the nature of the sound *per se*. He never regarded microintervals as transitional tones, but rather as an autonomous part of the tonal language. During the premiere of *Modulations* (1978), Grisey noticed that the intonation of microintervals was initially a problem for musicians; they displayed a technical shortcoming connected with their attempts to find, for example, the right fingering for producing such intervals. However, as the composer noted, a more frequent experience with sounds of this kind meant that within a few years the execution of microintervals was no longer a problem in either performance or perception.

A characteristic feature of Grisey's spectralism – which he did not treat systematically, but only as a certain attitude towards musical creativity – is the consideration of sounds as living entities, and not as inanimate raw material used in the composer's work. In this approach, the sound 'is born', 'lives' and finally 'dies',<sup>7</sup> and so is subject to constant change. Consequently, the perceptual capturing of a sound takes time. Sounds that are differentiated among one another by their acoustic qualities integrate themselves into a certain process and determine a specific time.<sup>8</sup> Like other living organisms, the sound – in this understanding – 'lives' not in isolation, but for other sounds and thanks to other sounds in its immediate spatial and temporal vicinity, before its 'birth' and after its 'death' (decay). Grisey also ascribes to sounds a certain force, which triggers the continual transformation of their own energies. The 'living', enduring

<sup>5</sup> Claudy Malherbe, 'Seeing Light as Color; Hearing Sound as Timbre' (trans. Joshua Fineberg and Berry Hayward), *Contemporary Music Review* 19/3 (2000), 15–27.

<sup>6</sup> David Bündler, 'Interview with Gérard Grisey, 18 January 1996, Los Angeles', [www.angelfire.com/music2/davidbundler/grisey.html](http://www.angelfire.com/music2/davidbundler/grisey.html) accessed 10 October 2009.

<sup>7</sup> 'Spectralism [...] considers sounds [...] as being like living objects with a birth, lifetime and death'. Ibid.

<sup>8</sup> Gérard Grisey, 'Zur Entstehung des Klanges', *Darmstädter Beiträge zur Neuen Musik* 17 (1978), 73–79.

sound, through which energy is constantly flowing, affects other sounds around it, resulting in the forming of all the parameters of the sound. None of the physical parameters of a sound (e.g. frequency, intensity, duration, spectral structure) is a constant feature of that sound. Grisey proposes treating these parameters as a momentary concretisation of a complex network of multilateral interactions among them, which modify the parameters' physical values. The defining of the physical parameters of a sound is a simplification, enabling it to be set within a certain descriptive framework. Essentially, the physical values of parameters may be determined for a particular sound at a given moment in time, but only by means of acoustic experiments, since – from the point of view of acoustic psychology – a sound is perceived holistically, integrally, and not analytically, through the perception of individual sensory features resulting from the physical values of the parameters.<sup>9</sup>

Reflection on the essence of the sound also forced Grisey to answer the question as to whether, at a time when information is just as real an entity as matter or energy in the universe, a sound is information. A singular conclusion to this reflection is the forming of a sort of ecological approach to various sounds<sup>10</sup> which – as a result of considering them as living entities – one should accept as they are and try to find for them an appropriate place or function within the context of a work. An ecological attitude to sounds requires a return to the origins of the sound, to the nature of sound in general. In addition, it assumes the need to reformulate the relationship both between an isolated acoustic case and a musical whole, as well as a change of attitude and behaviour towards the natural environment.<sup>11</sup> His search for a place and function for the sound in a work led Grisey to classify music into two types. The first type of music is characterised by the fact that the composer speaks in the work about various things through sounds. This is music which requires declamation, rhetoric and language. As Grisey himself said, this is music of disquisition, music of speech, as created by Luciano Berio, Pierre Boulez, Arnold Schoenberg and Alban Berg. The other type of music is not disquisition by means of sounds, or speech, but more the capturing of the state of the sound. Grisey regarded such composers as Iannis Xenakis, Stockhausen and

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<sup>9</sup> Ibid.

<sup>10</sup> Ibid., 75 ; also Gérard Grisey, 'Musique: le devenir du son', in *Vingt-cinq ans de création musicale contemporaine: L'Itinéraire en temps réel* (Paris, 1998), 297, cit. after Eric Drott, 'Timbre and the Cultural Politics of French Spectralism', *Proceedings of the Conference on Interdisciplinary Musicology (CIM05)*, Montreal (Quebec), Canada, 10–12 March 2005.

<sup>11</sup> Gérard Grisey, 'Tempus ex machina: A composer's reflection on musical time', *Contemporary Music Review* 2/1 (1987), 239–275, 242–243.

himself as creators of such music, whilst emphasising that he had never thought about music in the sense of declamation, rhetoric or language.<sup>12</sup>

Grisey was interested in the 'evolution of the sound'. In this context, he postulated the need for changes in the way the raw material of music was treated. In his opinion, the composer should focus on sounds and not on notes, by which he wished to emphasise the significance of the dynamic character of acoustic material (as opposed to the 'staticity' of notes). The dynamic character of sounds releases within their simultaneous flow differences between them, the observation of which allows one to control the evolution (or lack of it) of sounds and the speed of that evolution.<sup>13</sup> Compositions require one to listen to sounds in themselves; their musical language and syntagmas are based on the fundamental exploitation of the sonic phenomenon in all its complexity, from harmonic tones to nonharmonic tones. Works from the years 1970–80 contain both self-generating phenomena and self-destructive elements. *Modulations* (1976–1977), from the cycle *Les Espaces Acoustiques* (1974–1985), displays acoustic zones – soundfields – in continual motion around a fundamental partial E (41.2 Hz). This is an example in which at any given moment the acoustic material seems to be gathered just for itself, so that new material may be formed (the allegory of self-genesis, self-generation), whilst the form of the work gives a detailed account of 'the history of the sounds from which it is made'.<sup>14</sup> In *Modulations*, Grisey made use of the acoustic phenomenon of the occurrence of difference tones. He gave the generated sounds to the organ and brass, and the rest of the orchestra intoned difference tones (differentials). In this way, he determined a network of additional frequencies (a typical example of structuring) – a calculable material which acts like shadows cast by the main pitches (the generated sounds).<sup>15</sup> Grisey explained the essence of 'shadow-casting sounds', pointing to the use of a certain type of sonic transformation in which the composer adapts difference tones (combination tones) created during the simultaneous intonation of at least a couple of sounds. The composer drew attention to the fact that certain intervals 'do not cast shadows', since resultant tones only strengthen the 'light' of their harmonics. Other intervals, meanwhile, form a network of re-

<sup>12</sup> Bündler, 'Interview with Gérard Grisey'.

<sup>13</sup> 'No longer composing with notes but with sounds; no longer composing only sounds, but the difference that separates them [...]. Acting on these differences [...] controlling the evolution (or non-evolution) of the sound and the speed of its evolution.' Grisey, liner notes to *Les Espaces Acoustiques*, trans. John Tyler Tuttle, Musidisc France 2001, Una corda 465 387-2, cit. after John Young, *Sound in Structure. Applying Spectromorphological Concepts* (Montreal, 2005), 2.

<sup>14</sup> Pierre-Albert Castanet, 'Gérard Grisey and the Foliation of Time', trans. Joshua Fineberg, *Contemporary Music Review* 19/3 (2000), 29–40, at 31.

<sup>15</sup> Eric Daubresse and Gérard Assayag, 'Technology and Creation – The Creative Evolution', trans. Joshua Fineberg, *Contemporary Music Review* 19/2 (2000), 61–80.

sultant (difference) tones infinitely more complex and far removed in the frequency range from generated sounds and their harmonics.<sup>16</sup>

A few years after composing *Les Espaces Acoustiques*, Grisey clearly indicated the special role of this cycle in the concretisation and explication of his 'ecological attitude to sounds'. He pointed out that *Les Espaces Acoustiques* was a sort of laboratory, in which he applied spectral techniques to various situations (from a solo to the whole orchestra). Grisey realised that the cycle possesses an almost didactic character, since it contains fragments in which he sought to demonstratively elucidate the character of the language he was gradually devising, but which was most fully captured in this work. One feature of this way of composing is the use of instruments (microsynthesis) to express various partials of a sound and the elaboration of an integral sound-form (macrosynthesis). This makes it possible to articulate and organise a whole range of sounds, from the harmonic spectrum, through various in-harmonic spectra, to white noise.<sup>17</sup>

The overall sound of a musical work is generally understood through a network of connections established between its partials. In this context, timbre is one of the principal forces generating musical form, acting jointly with various types of syntax. However, the essence of serial music is the disintegration of the sound into distinctive parameters resulting from the expressive features of their physical equivalents, and the starting point for serial compositions are pitches, durations, loudnesses and timbres set out in series. Opposed to the creative attitude manifested in serial music, in their efforts to formulate a new attitude towards the composing of music, Grisey, Tristan, Murail and Dufourt set out to restore the inter-parameter unity that serial music had lost. This unity was to be achieved 'under the banner of timbre'.<sup>18</sup> Grisey considered that timbre possessed a strong qualitative value, which inevitably hampered any sort of serialising procedure. In Grisey's opinion, timbre explodes every kind of matrix or 'network' from the inside and forces composers to adopt a different way of thinking, 'because it possesses a priori a correlated set of energies'.<sup>19</sup> Describing timbre as an expressive feature in which the indivisibility and interconnection of all sonic parameters is clearly apparent, Grisey symbolically bestows upon it a compensatory function. The

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<sup>16</sup> Grisey, 'Structuration des timbres dans la musique instrumentale', in *Le Timbre métaphore pour la composition*, ed. Jean-Baptiste Barrière (Paris, 1991), 352–385, at 370, cit. after Malherbe, 'Seeing light', 20.

<sup>17</sup> Guy Lelong, 'Portrait de Gérard Grisey', trans. John Tyler Tuttle, *Revue du Festival Musical* (Strasbourg, 1996), <[www.arsmusica.be/cms/oeuvre\\_nl.php?oobj=artoe&iobj=504&notice=y](http://www.arsmusica.be/cms/oeuvre_nl.php?oobj=artoe&iobj=504&notice=y)> accessed 10 October 2009.

<sup>18</sup> Drott, 'Timbre and the Cultural Politics', 3.

<sup>19</sup> Grisey, 'Structuration des timbres', 385, cit. after Drott, 'Timbre and the Cultural Politics', 3.

conception of timbre in the approach of the leading spectral composers is opposed to a barren and quantitatively defined notion of the sound. It is conceived as an integral, irreducible quality, on the foundations of which the dismembered aspects of the sound will be (post serialism) newly connected. Another attribute of timbre that is valued by the spectralists is its dynamism. Grisey related this to a 'set of energies', the presence of which he made manifest in the title of his 1989 essay 'Musique: le devenir du son'.<sup>20</sup> According to him, these energies permeate the musical work and in effect manifest themselves in a network of interactions determining every conceivable parameter of a work.<sup>21</sup> Grisey attributed the division of the sound into discrete parameters to a fundamental flaw in the abilities of human perception. He emphasised that an assessment of timbre is a function of its duration, intensity, etc. and that the list of such mutual influences can be expanded endlessly. That is why our perceptual limitations provoke us to form parametric scales in relation to the continuity of a phenomenon. By means of his 'ecology of sounds', Grisey wished to overcome part of the anthropomorphic attitude, the presence of which he discerned in the tendency to 'parametrise' the sound.<sup>22</sup>

Spectral music replaced the principle of interval sequence and motivic transformation with the principle of fusion and continuity,<sup>23</sup> although Grisey stressed that timbre was something more than the fusion of the expressive features of sounds<sup>24</sup>. Timbre stands at the head of a compositional strategy as the reference point of a creative process in which different approaches – structural and spectro-morphological – were applied. Crucial to the structural approach are the highly complex temporal levels of the acoustic phenomenon. The spectral composition of timbre serves the creation of a new system of pitches based on the harmonic series and the reconstruction by means of acoustic instruments of the structure of certain timbres. This should be understood in the following way: in the structural approach, one obtains on the higher level a megatimbre, which changes over time. In spectral music, pitch and timbre are treated not as separate notions, but as different aspects of the same phenomenon.

In comparison with music based on the tonal system, in spectral music, the notion of the tension between consonance and dissonance is replaced by a more broadly understood tension created through the opposition between

<sup>20</sup> Drott, 'Timbre and the Cultural Politics', 3–4.

<sup>21</sup> Grisey, 'Zur Entstehung', 75.

<sup>22</sup> Grisey, 'Musique: le devenir', 294.

<sup>23</sup> Francis Rose, 'Introduction to the pitch organization of spectral music', *Perspectives of New Music* 34/2 (1996), 6–37.

<sup>24</sup> Bündler, 'Interview with Gérard Grisey'.

sound and noise.<sup>25</sup> The function of timbre evolved from adding colour to certain pitches to determining an entire structure. Timbre acting as a structuring element contributes to the formal construction of a musical work and works together with various syntaxes. Timbre as a highly complex acoustic phenomenon – a multidimensional expressive feature of every sound – can provide many syntactic possibilities for the creation of a composition. In particular, spectral music employs a broad and complex approach to the shaping of timbre.<sup>26</sup> Hence Grisey's treatment of spectralism as a metaphor of timbre, stressing that the analogy between the acoustic model and the current shaping has an aesthetic rather than a mathematical sense. In fact, the real shaping of the structure of a sound within a musical text is rather impossible.<sup>27</sup> All strategies for composing music cannot reconstruct, but rather metaphorically replace, the nature of the sound. Consequently, a composition refers no longer to notes, but to an expanded look at the acoustic object: 'sound – timbre – metaphor'.<sup>28</sup>

In characterising the spectralists' new treatment of timbre, attention should be drawn to the change to its concretisation in music. The idea of *timbre-matière* in the traditional art of orchestration was based on the delicate mixing and balancing of instruments placed within abstractly constructed configurations of chords, counterpoints or harmonies. In spectral music, this idea was replaced by the *timbre-son*, based on acoustics. In this approach, instrumentation is derived from the natural sound, first subjected to analysis aimed at revealing its constituent elements. In this way, Grisey (and also Murail), drawing on notions and tools borrowed from acoustics, developed and renewed the acoustic intuitions of Edgar Varèse and György Ligeti, and also the pre-spectral improvisations of Giacinto Scelsi.<sup>29</sup> In relation to the musical material, through the rebuilding of the acoustic material according to a model drawn from the sound spectrum, the sound could now be controlled with substantial precision. Modifying the distribution of the constituent elements of a sound, it can be gradually altered from consonance to noise, from stability to instability, etc. In effect, coherent timbres produced by the spectral fusion of various configurations of the constituent elements of a sound are audible where one can notice in the score only complexes of distinctive elements, that is, structures with diversified pitches, duration, dynamics and articulation.

<sup>25</sup> Kaija Saariaho, 'Timbre and harmony: interpolations of timbral structures', *Contemporary Music Review* 2/1 (1987), 93–133.

<sup>26</sup> Livia Teodorescu-Ciocanea, 'Timbre versus Spectralism', *Contemporary Music Review* 22/1–2 (2003), 87–104.

<sup>27</sup> Grisey, 'Structuration des timbres', 385.

<sup>28</sup> Teodorescu-Ciocanea, 'Timbre versus Spectralism', 89.

<sup>29</sup> Malherbe, 'Seeing Light', 17.



In the shaping of timbre, Grisey often made use of visual metaphors evoking light and shade. One such example is *Jour, Contre-jour* for electric organ, 13 musicians and tape (1979), in which a soundfield filled with sounds from an extremely high register to an extremely low register corresponds to a light-casting field which passes from the greatest brightness to absolute darkness. The 'illuminating' function is held here by pure harmonics, derived from the spectrum, whilst the 'shadow is cast' by difference tones. In this same work, Grisey delimited, through suitably liberated timbres, the limits and framework of the composition. The beginning and the end of the work are conceived in such a way as to connect the composition to the extra-musical environment, which precedes the performance of the music and follows it. The beginning of *Jour, Contre-jour* is a high frequency, intoned in the form of a delicate, furtive whistle, emerging from the noise caused by the instrumentalists gathering on the platform and the listeners getting ready for the music to start. The whistling increases and the listeners grow gradually quieter. The musicians are ready to play, and the orchestra interprets the work. The ending of *Jour, Contre-jour* proceeds in the reverse order, as it were, and so the passage between musical time and the more usual time of human activity is blurred.<sup>30</sup>

A care taken to impart structural functions to timbre is also manifest in cyclic forms of music. In Grisey's flagship cycle, *Les Espaces Acoustiques* (*Prologue* for solo viola, *Périodes* for 7 musicians, *Partiels* for 18 musicians, *Modulations* for 33 musicians, *Transitoires* for orchestra, *Epilogue* for 4 solo horns and orchestra), it is initially the solo viola which participates in the shaping of timbre, then a small ensemble, which is gradually augmented until the full-scale orchestra used in the finale of two works in the cycle. The episodes in *Périodes* show various techniques for treating a sound in instrumental ensemble. This work essentially defines the type of form which is important for the cycle. This is a 'quasi respiratory form',<sup>31</sup> constructed around a specific soundfield (the harmonic spectrum of the sound E), from which the articulation will be commenced, through the greater or lesser receding of all the proposed acoustic variants. We also observe in the cycle a natural introduction to the next section, with the use of a change which allows the performance apparatus to be expanded from seven to eighteen instruments (between *Périodes* and *Partiels*, there is a correspondence between the closing and opening harmonies). The end of *Partiels* heads towards silence and brings in a rest, which allows the remaining musicians to enter the platform, in order to augment the forces of the performance apparatus to the size of a full-scale orchestra. Grisey took care to limit the break in the cycle's conti-

<sup>30</sup> Ibid., 20–21.

<sup>31</sup> Lelong, 'Portrait de Gérard Grisey'.

nuity (caused by the rest) by introducing a series of visual gestures 'filling out the rest'; the musicians gradually take their places on the platform, turn the pages in the score, handle their instruments and move their chairs, the percussionist gradually raises two cymbals for striking, which triggers a return to silence. Sudden darkness 'freezes' his gesture, and the cymbals do not strike; there appear light and a rest. The change in forces that occurs between *Modulations* and *Transitoires* is achieved gradually, between two ensembles creating a momentary surreal expansion of the music of *Modulations*. In the close of *Transitoires*, we hear a solo viola (that of the *Prologue*), the music of which – taken up by the four horns in the *Epilogue* – closes the cycle.<sup>32</sup>

In relation to the shaping of timbre in spectral music, Grisey was aware that the simulation of sounds through the use of spectral techniques was merely a trick in respect to the discipline (acoustics) which inspired it. Grisey emphasised that 'the instrumentation and the distribution of force and intensity suggest synthetic spectra, which are nothing other than a projection of naturally structured sounds into an expanded, artificial space'.<sup>33</sup>

In the 1990s, Grisey was fascinated with the processuality of time and form. He understood time in music in a particular way, not identifying it with the use of long and short rhythmic values of sounds. Instead, he considered that time was stretched out in all directions. Consequently, it needed to be stated what stretched-out time was presupposed by language; how one should compose in order to achieve stretched-out time in a work without employing structures like chromatic clusters (as in Ligeti's *Atmospheres*). Grisey was convinced that the answer to this question would be a real starting point for spectralism.<sup>34</sup>

For Grisey, real musical time was only a place of exchange and accord among a multitude of times.<sup>35</sup> In compositional tradition, the time occurring within musical structures is interpreted as a straight line, which can be divided according to proportions fixed by the composer. The listener perceiving music stands, as it were, in the middle of this line. According to Grisey, such an understanding of musical time is pure abstraction, not reflected in real perception. In actual fact – so Grisey held – time perceived by the listener to music is observed from the level of another time, which is strictly linked to the rhythm of our lives. The exchange and accord among various layers of time – between them, there occur crossings, open spaces, which can, for example, converge – results from this dynamic, which in turn is an effect of the interactions that arise between the psychophysiological time of hearing (the

<sup>32</sup> Malherbe, 'Seeing Light', 23–24.

<sup>33</sup> Grisey, 'Structuration des timbres', 356.

<sup>34</sup> Bündler, 'Interview with Gérard Grisey'.

<sup>35</sup> Grisey, 'Tempus ex machine', 139–275.

rhythm of one's heart and breathing and an increasing weariness with listening) and the mechanical time of the sound. Posing himself the question as to how to treat time in music, Grisey stated that there was no notion in the world which could state unequivocally that something lasts too long or not long enough. Everything depends on the kind of information being transmitted.

During a certain period in his reflection on music, Grisey was influenced by Conlon Nancarrow, who created music in a condensed time – a kind of music written for or by insects or small creatures. Grisey tried to integrate such an extremely condensed time with time related to the tempo of spoken language and with stretched-out time.<sup>36</sup> He considered that the creation of music ought to refer to the direct composing of musical time, which can be captured in the act of perception, and not to time measured beyond actual impressions – to chronometric time. Between two successive sound events, there exists a 'density of the present', of variable dimensions.<sup>37</sup> Three kinds of time can be distinguished, depending on the relationship that exists between two successive events. Small differences between the events produce a natural passage of time, as it were – time with a specific velocity, analogous to the tempo of language. The occurrence of an extremely different event after a previous event disrupts the linearity of the passage of time: time contracts. If the succession of events is not surprising, and even predictable, for the listener, then the 'density of the present' increases and time expands. Focussing the experience of music on some detail – on the internal structure of a sound – also expands time; in this case, everything occurs as if in slow motion. Grisey ascribed this contraction and expansion of time to the existence of 'holes in time', in its linear passage.<sup>38</sup> He was interested in the way time was perceived not only by people, but also by other living beings. The effect of this reflection is the definition of expanded, stretched-out time as the time of whales. Grisey indicated that in the world of birds and insects, everything happens more quickly, and so he called contracted time the time of birds or the time of insects. Grisey understood music and the forms in which it is expressed not as a configuration of musical structures construed of sounds, but as pure duration. This explains his critical attitude towards the 'static' conception of time which led to such compositional practices as Olivier Messiaen's irreversible rhythms or the sequencing of rhythmic values in serial technique. Grisey saw a need for change in such an understanding of musical time and for these changes to be given the rank of a Copernican revolution.<sup>39</sup>

<sup>36</sup> Bündler, 'Interview with Gérard Grisey'.

<sup>37</sup> Grisey, 'Zur Entstehung', 73–79.

<sup>38</sup> Ibid.

<sup>39</sup> 'What a utopia his spatial and static version of time was... What a spatial view of musical time – but also what anthropomorphism there is in this image of man at the center of time, a listener fixed at the very center of the work to which he is listening! One might say that a truly Copernican revolution remains to be fought in music [...]', cit. after Grisey, 'Tempus ex machine', 242–243.

This particular treatment of musical time is concretised in the composer's work. In *L'Icône Paradoxale* for soprano, mezzo-soprano and orchestra, divided into two ensembles (1994), Grisey referred to the visual logic characteristic of Piero della Francesca's fresco *La Madonna del Parto*. This reference is manifest in the title of the composition, the distribution of the instrumental ensembles and the structure of the work. *L'Icône Paradoxale* is a sort of tribute to Piero della Francesca (1420–1492), a symbolic figure of the Quattrocento, author of the treatise *De perspectiva pingendi*, in which he analyses the perspectives used in painting. Grisey did not commonly employ poetical texts in his music, as they demand a natural tempo of narration – the time of language. In this work, however, the composer made use of part of the treatise, written in a highly technical language. The soprano and mezzo-soprano are treated here instrumentally – long-held sounds, devoid of melodic character – and the vocal parts are grounded on an analysis of sonograms of the spoken text. The large instrumental ensemble is divided into two groups intoning sounds in a high and low register, whereas the small instrumental ensemble is divided into two symmetrical groups, flanking the two vocal parts.

An analysis of the form of *L'Icône Paradoxale* allows one to note the presence of two contrasting evolutionary processes – analogous to two diagonals, for which the point of intersection is fixed in the middle of a visual composition – and the temporal material is divided into different levels. Grisey modelled his shaping of the temporal material on the proportions contained in the fresco: 3-5-8-12. As a result, there appear four kinds of time. Time I is extremely compressed; its duration is entrusted to the group of instruments of the large ensemble in a high register. This group intones for 16 seconds a 'contracted' version of the beginning of the work. This is a musically-obtained perspective which viewers employ when looking at a picture from a great distance – they can follow the indistinct distribution of colours and forms. This reduction in format is perceived through fragmentary progressions and repetitions. Time II is an analogy of time as linguistically perceived. The vocal parts accompanied by the small instrumental group perform a slow evolution, beginning with the intonation of vowels and leading to the intonation of consonants, from colour to the obtaining of sounds similar to noise, long sounds contrasted with rhythms.

Time III is the timbral opposite of Time I (it is interpreted by the second group of the large ensemble in low registers), although it is also linked to Time II, linguistic in character. We observe here a sort of decompression of Time II, obtained through the articulation in a slow tempo of the 'noise' of the vowels contained in various texts by della Francesca (in Latin and in Italian). Finally, Time IV undergoes extreme 'decompression'. The whole of the orchestra intones a slow spectral punctuation, which – from the beginning to the end of *L'Icône Paradoxale*, as always in Grisey's music – defines the presence of various harmonic fields.

In his introductory note to *L'Îcône Paradoxe*, Grisey concluded: 'When Times I and III cross, at the point where the diagonals intersect, a constant and periodic rotation fills all the sound space available'.<sup>40</sup> The composition ends with a three-part stratification (the accumulation of Times I, II and IV), followed by a brief coda invoking the complete spectral material.<sup>41</sup>

The specific treatment of time also refers to the interpretation of cosmic time. Such an idea inspired Grisey in another of his compositions: *Le Noir de l'étoile* (1990) for 6 percussionists placed around the auditorium, audio tape and a retransmission of astronomic signals. The composer's interest in the sounds of pulsars arose from his meeting with the astronomer and cosmologist Joe Silk, in 1985. In the programme to *Le Noir de l'étoile*, Grisey stated<sup>42</sup> that in spite of the awareness that – with or without our participation – 0359-54 and *Vela Pulsar* would be continuing their endless revolutions and reach interstellar spaces, thanks to a radio telescope we can integrate their electromagnetic waves into a sophisticated cultural event – a concert. The moment of the pulsars' crossing of the sky is specified by a precise date. In order to use the effects of the pulsars' rotation as musical material in a musical work, the composer must – according to Grisey – combine the concert itself (the performance of a work) with the cosmic rhythm. In this context, the pulsars will determine not only the different tempos and pulsations of *Le Noir de l'étoile*, but also the exact moment of the work's performance. Grisey integrated music created by the tempo of the rotation of two pulsars (the remains of a Super Nova) into a tonal discourse. The acoustic effects derived from *Vela Pulsar* were pre-recorded, whereas the effects of 0359-54 were captured during a performance of *Le Noir de l'étoile* thanks to a radio telescope. The sounds created by a neutron star are the result of an audible transcoding of electromagnetic waves, and they can be heard in spite of the fact that it takes at least 15,000 years for them to reach the earth.<sup>43</sup> As Grisey noted in his preface to *Le Noir de l'étoile*, this is 'music with pulsar obbligato!'

One important element in Grisey's approach, which defined the mental reality of spectral music, was reflection on the abilities of human perception. At this point, the mental reality of spectral music is clearly linked to psychic reality. The composer realised that tonal music had a huge advantage over spectral music in that it had been consolidated over a long period of time,

<sup>40</sup> 'Lorsque les temps I et III se croisent, au point d'intersection des diagonales, une rotation continue et périodique envahit tout l'espace sonore disponible', Grisey, Foreword to *L'Îcône Paradoxe*, <[http://www.arsmusica.be/cms/oeuvre\\_en.php?oobj=artoe&iobj=90&notice=y](http://www.arsmusica.be/cms/oeuvre_en.php?oobj=artoe&iobj=90&notice=y)> accessed 10 October 2009.

<sup>41</sup> Castanet, 'Gérard Grisey', 36–38.

<sup>42</sup> Grisey, Foreword to *Le Noir de l'étoile*. <[http://www.arsmusica.be/cms/oeuvre\\_en.php?oobj=artoe&iobj=428&notice=y](http://www.arsmusica.be/cms/oeuvre_en.php?oobj=artoe&iobj=428&notice=y)> accessed 10 October 2009.

<sup>43</sup> Castanet, 'Gérard Grisey', 34.

thanks to which listeners could predict the occurrence of successive musical structures. In Grisey's opinion, the ability and inability to predict, anticipation and surprise, the sort of game that is played out between the listener and the composer of spectral music, is the factor which determines that time lives; and that is why it is musical time. This assertion reflects not only a particular care over the appropriate shaping of time in music, but also a care to take account in the creative process of the abilities of human perception. Grisey stated that: 'By including not only the sound but, moreover, the differences perceived between sounds, the real material of the composer becomes the degree of predictability, or better, the degree of "preaudibility". So, to influence the degree of preaudibility we come back to composing musical time directly – that is to say perceptible time, as opposed to chronometric time (time determined by a clock or other conventional measurements).'<sup>44</sup> Grisey took care to ensure that listeners perceiving his music would not end up 'behind a wall of information', through which they would not be able to find 'their own way' in their contacts with the music. The temporal constructs which he included in *L'Îcône Paradoxale* can be difficult for the listener to follow, which is why he employed various means to make them more obvious, more distinct for the listener, such as recurring ideas or frequent repetitions. Grisey pointed out that when one is familiarising oneself with a new score, one does not follow it through in detail, but rather seeks the place in which the first distinct change occurs. He defined that place as the place in which the composer attained and fixed some idea, also comprehensible in the listener's perception. Yet the difficulty in the creative process lies not in the fact that this idea is fixed, but in that the composer has to fix the subsequent idea and know where and when to introduce it.<sup>45</sup> In this context, Morton Feldman seems to be an exceptional composer. According to Grisey, he creates anti-music, as he deceives all the listener's expectations. He establishes an idea or model which the listener understands and which he anticipates as the work progresses, foreseeing its development in a particular direction, but Feldman does not proceed in that way and arouses surprise in the listener. Elsewhere, however, Feldman does develop a work exactly as the listener imagines it.<sup>46</sup>

During a lecture delivered to the Internationale Ferienkurse für Neue Musik in Darmstadt (1978), Grisey devoted a great deal of attention to perception. He was aware of a certain limitation to the abilities of perception, particularly in relation to motion, and so also to dynamically constructed music. He stressed that the listener 'will not get lost' in listened-to music if the composer provides points of reference which the listener will notice and re-

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<sup>44</sup> Cit. after Grisey, 'Tempus ex machine', 242–243.

<sup>45</sup> Bündler, 'Interview with Gérard Grisey'

<sup>46</sup> Ibid.

member. In the act of attentive listening to music, we become aware of the presence of some object of perception, and then we continually compare subsequent sound events with that object or objects which, thanks to music previously experienced, have created in our memories certain cognitive schemata or patterns. As Grisey stated, the difference or lack of difference between compared objects defines the essence of perception.<sup>47</sup> The listening to music which is meant to lead to its understanding by the receiver cannot involve the organising of a perceived sound event through reference to an average norm. One crucial feature of music is the forming of different relations between changeable configurations of sound events. These relations oblige the listener to keep thinking 'forwards and back', in order to grasp the mutual influence of the musical material and the process of shaping the dynamic form of the music. The individuality of a sound event can be grasped thanks to the contexts which expose it. This means that a sound of a particular pitch (a harmonic complex tone) shows its individuality in the context (against the background) of noise just like the sound of a particular interval is distinguished within the surroundings of other intervals. Grisey indicated that in perception there must exist some 'point zero', defining the threshold from which music should develop. Rapid beats change the timbre of a sound (this is exploited, for example, in the construction of various timbres in organs), but slow beats, due to their periodicity, are perceived as rhythms.

Another aspect of perception is its connection with composed musical time (as Grisey understands it). When experiencing microacoustic phenomena, we have to 'magnify' them. Based on this assertion, Grisey assumed that there exists a law of perception indicating the reverse dependency between the acuity of audio perception and the acuity of temporal perception. This means that if we wish to perceive microacoustic phenomena – to sharpen our audio perception – then we have to slow the time of perception (small acoustic phenomena = long time of perception).

Finally, it is also worth drawing attention to Grisey's assessment of the perceptual effects of 'instrumental synthesis' familiar to him and practised by him. At this point, we touch on the question of the physical reality of spectral music and the understanding of the word 'nature' in the context of the second of the definitions enumerated above, that is, as 'a set of features characteristic of a given group of phenomena'. Grisey understood the fusion of partials into a single sound image as a sort of extreme synthesis (*nec plus ultra*), by means of which the detail is considered as part of the whole. He emphasised that in listening to a spectrum realised by a group of instruments, 'the ear, generally speaking, doesn't discern partials, but is satisfied with a global perception –

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<sup>47</sup> Grisey, 'Zur Entstehung', 73–79.

what one calls “timbre”).<sup>48</sup> In ‘instrumental synthesis’, each instrument of the ensemble – through the intonation of a given partial of the spectrum – helps to show the spectrum of the sound on the macro scale, and in this way a compromise is reached between the forces of fusion on one hand and of differentiation on the other. According to Grisey, such synthetic spectra are located in the zone bordering on the threshold of awareness. The result of ‘instrumental synthesis’ in relation to our (human) perception is described by Grisey as a ‘hybrid entity’, that is, a sound which, no longer a timbre, is no longer entirely a chord.<sup>49</sup> This means that when abandoning either complete synthesis or disintegration into a set of discrete instrumental timbres, such ‘hybrid entities’ overcome the razor-sharp line dividing differentiation from integration.<sup>50</sup>

The naturalistic context of music would appear to have been present in the work of twentieth-century composers before Grisey, as well. After all, such composers as Messiaen, Xenakis and Mauricio Kagel used nature as musical material, in its raw form – water, wind, fire, etc. – when recording naturally-formed sound phenomena to create material for composed music or playing them back during its performance. However, the approach of the spectralists, including – perhaps above all – Grisey, is exceptional in this respect. This approach is characterised by the directing of attention towards other aspects of nature, towards the organic, living, acoustic nature of sound and the listener’s abilities for perception. An increased interest in the ‘living nature of sound’ orientated the spectralists towards acoustics and philosophy, and also the latest technologies, in the context of which they consider the physical and cultural aspect of sound. That is one interpretation of the origins of spectralism, although it also stems from the much earlier work of such thinkers as Galileo, Rene Descartes and Isaac Newton.

The shift in the treatment of sound and the processual approach to time and form meant that the material used by the spectralists was too difficult to imagine, capture, organise and transform without employing the latest scholarly and technological advancements. The phrase *informatique musicale* – often linked with a description of the spectralist current (especially in relation to composers associated with the *l’Itinéraire* group, formed in 1973) – has a wider context than its English equivalent *computer music*. It encompasses all aspects of music connected with computer technology: from assisting the compositional process and improving the effectiveness of musical notation to the synthesis/analysis of sounds and the playback of music which in the real time of performance requires the involvement of electronic techniques. Consequently, composers, particularly spectralists, sought to break with tradition and with their personal knowledge and previous tools, con-

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<sup>48</sup> Grisey, ‘Musique: le devenir’, 296.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid.



sidering that they had to achieve the possibility of controlling the entire phase of creation, being at once the composers, 'instrument makers' and performers or interpreters of the new music. The work of the spectralists can be defined as an attempt to create a musical and aesthetic equivalent of scholarly work. It has been assumed that the spectralists' approach only corresponded to perceptual phenomena, and yet spectral representation exists beyond any perceptual tools and in principle is defined by the Fourier transform<sup>51</sup>. And so composers taught themselves programming language, studied timbre and some of its characteristics with particular relish, and also directly adopted discoveries relating to acoustic phenomena. They formalised these discoveries and employed them in such a way as to produce new musical material. In producing symbolic and acoustic material, the spectralists proceeded from acoustic and musical multi-representation to the process of programming.

In this situation, the computer became a crucial implement of composers' work. It enabled or accelerated the execution of many operations which could not be omitted during the phase of creation – from duplicating scores to recording synthesised sounds in the real time of their duration. The computer and its programs enabled the use and development of many compositional algorithms, the simulation of the orchestra or other performance groups and the controlling of synthesisers.<sup>52</sup>

A special relationship developed between scientists, responsible for progress in acoustics and psychoacoustics, and composers. In the French spectralists' 'mother unit', IRCAM<sup>53</sup>, a special term was even produced – *compositeur en recherche*, which indicates the function held by the composer within a research group. The composer was a sort of consultant assisting the research group with its work towards carrying out a musical evaluation of computer tools, documenting the results of their use and carrying on an exchange of ideas. Both sides anticipated significant effects from this collaboration. Composers wanted to achieve a permanent and complete access to representation, the possibility of manipulating, organising, parametrising and producing material. Scientists sought to arrive at a better understanding of the phenomenon associated with the forming and perception of sound and to discover a system which would enable them to access and control this knowledge.<sup>54</sup>

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<sup>51</sup> The transform is a function, and transformation is an operation on an original function which produces a transform. Fourier's transformation spreads the function into a series of periodic functions, such that the transform obtained reveals which frequencies comprise the original function.

<sup>52</sup> Daubresse and Assayag, 'Technology and Creation...', 61–63.

<sup>53</sup> *Institut de Recherche et Coordination Acoustique/Musique*.

<sup>54</sup> *Ibid.*, 64–65.

Grisey was fully aware of the possibilities provided by technology. He knew that a composer possessed many more tools than at any point in music history. Yet he himself made quite limited use of the computer and electronics. He ascribed this to his lack of talent in operating a computer and digital technology, and above all to the fact that the music produced by means of these tools was notoriously revision dependent. Continual changes in systems and software make it necessary to renew the tools employed in a particular composition, since otherwise there may occur a moment in which the restricted access or lack of access to a system used at a given time means that a work cannot be heard in the concert hall. This obliges the composer to revise compositions, which Grisey was not too fond of. As one example, he cited the use of the Yamaha DX-7, which at the time it was produced seemed a quite stable instrument. Grisey integrated it into an orchestra. Years later, it turned out that it was such an obsolete instrument that every subsequent performance of the work would be hindered by the need to find the exact type of Yamaha specified in the original composition.<sup>55</sup>

Grisey's work attests his collaboration with scientists and his use (albeit restricted) of modern technologies. One such example is *Les Chants de l'amour* (1981–1984) for mixed voices and computer-synthesised voice. In this work, the composer used the Chant program created at IRCAM by Xavier Rodet and Yves Potard, which enabled him to produce a continuous voice and two streams of specific respiratory pulsation (incidentally, he also used here strict structures employed in polyphonic music of the fifteenth century and the playing of Pigmies from the Lituri region) (see Example 156).

The synthetic voice functions here as a comparative model for the vocalists, to whom he gave a similar role to the Tampur in Indian music.

'The machine voice can assume the roles of both Beauty and the Beast [...] Freely personified, the breath [...] learns to live, to sing, to move, to stammer, then finally to speak twenty-two different languages. Staged in the theater of life, the spatio-sonic relations of the man-chorist with the machine-singer is made up of both fusion and interaction, of conflict and phagocytosis, but also the false autonomy of many types of dialogue (of belligerents, of friends, of tender confidants).'<sup>57</sup>

In the middle section of this composition, Grisey fixed a system of human and mechanical voices alternating like an echo. In a moving scene, the chorus sings the last lullaby and falls asleep, dreaming to the snoring of an electronic monster. Commenting on the means employed here and their expression in the composition, Grisey said, 'Supreme seduction [...] that voice risks being

<sup>55</sup> Bündler, 'Interview with Gérard Grisey'.

<sup>56</sup> Repr. after Castanet, 32.

<sup>57</sup> Cit. after Castanet, 'Gérard Grisey', 31–33.

more human than a natural voice, both more pure and more painful.<sup>58</sup> Thus it seems that the composer succeeded in blurring the boundaries between natural and non-natural sound sources.

Example 1. Grisey, *Les Chants de l'amour*

<sup>58</sup> Ibid., 33.

In order to understand spectral music in the context of physical reality, one must take account of the fact that a balance between calculation and intuition, theory and experimentation, is essential for this music. The physical reality of spectral music is characterised by the use of sounds ranging from white noise to sinusoidal tones, going beyond the equal tempered system and rejecting the notion of the 'timeless' treatment of the acoustic material, that is, treating time like one of the partials of the sound itself.

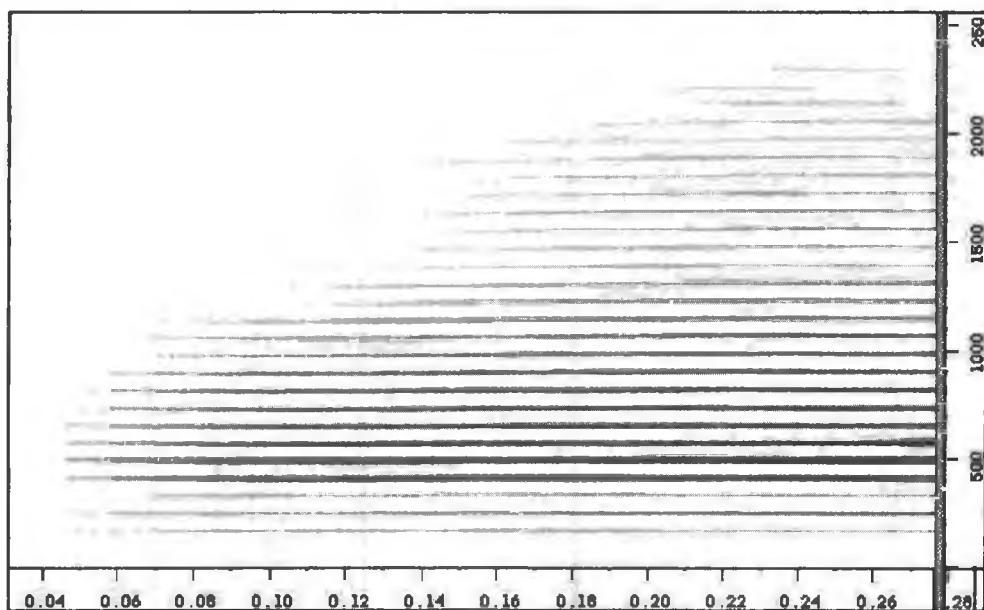
In creating *Partiels*, Grisey made use of analysis which enabled him to construct a harmonic and gestic model realised by eighteen instruments. He based his calculations on the results of an experiment relating to a Fourier analysis of the sound E2 intoned *forte* by a trombone. The effect of this analysis is a sonogram which shows the frequency composition of the sound at the moment when its stable phase is formed – the phase of 'attack'. This sonogram is a three-dimensional representation of changes in frequency, amplitude and time. This is a type of analysis of the structure of a sound which is fundamental for producing an additive synthesis or its orchestral derivation. The temporal profile of the sound illustrates the gradual appearance of its particular partials (lower partials appear earlier than higher partials) with varying intensity (dark areas on the graph show amplitudes: the fifth and ninth partials are louder than the rest and have a greater amplitude (intensity), which is why they are darker on the graph). From the sonogram, one can also conclude that partials above the loudest partials have a tendency to fade; their intensity is increasingly lesser, hence the increasingly light stripes on the sonogram.

On the basis of this sonogram, Grisey was able to create a musical model of the relative amplitudes of the partials from a harmonic series. Of course, for the purposes of performance, this model had to be transcribed into a notational script of the pitches and dynamics of sounds. This means that the physical parameters – frequency and amplitude – of each harmonic partial of the spectrum of the original sound E2 was transformed into its expressive equivalent – the pitch and dynamic of the sound. It should be stressed that the pitches were approximated by a quarter-tone to the sounds with fundamental frequencies closest to the frequencies of harmonics determined in the spectral analysis<sup>59</sup> (see Example 2<sup>60</sup>).

The score of *Partiels* contains all the data taken from an observation of the sonogram. Each note written in the score corresponds to one harmonic partial of the analysed sound.

<sup>59</sup> Joshua Fineberg, 'Musical Examples', *Contemporary Music Review* 19/2 (2000), 115–134.

<sup>60</sup> Repr. after Fineberg, 'Musical Examples', 116–117.



Example 2. Spectrogram and notation below

Grisey also took care to ensure, in allocating a particular partial for performance by a specific instrument, to conserve not only the pitch relationship between harmonics, but also the temporal proportions (the temporal intervals at which successive partials appear on the spectrogram), although the distances between their onsets were considerably increased due to the listener's perceptual abilities. The strength of each intoned sound also corresponds to the amplitude characteristic of a given partial on the sonogram<sup>61</sup> (see Example 3<sup>62</sup>).

<sup>61</sup> Ibid., 118.

<sup>62</sup> Repr. after *ibid.*, 118.

Handwritten musical score for Example 3, Grisey, *Partiels*. The score is for a large ensemble including Piccolo, Clarinet, Trumpet, Violin I and II, Viola, Violoncello, and Contrabass. It features complex rhythmic notation, including a 3/4 time signature with a tempo marking of 70-80. The score is divided into measures by vertical bar lines. Various dynamic markings (ppp, mf, f, pp, mp, ff) and articulation marks (accents, slurs) are present. Specific performance instructions like "con sordino (plunger)" and "alto sul ponticello" are written above the staves. Circled numbers (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11) are placed throughout the score, likely indicating specific harmonic or timbral targets. The bottom of the page shows a series of dynamic markings: sfffz, sffz, sfz, ppp, and ff, connected by arrows, indicating a crescendo and then a decrescendo.

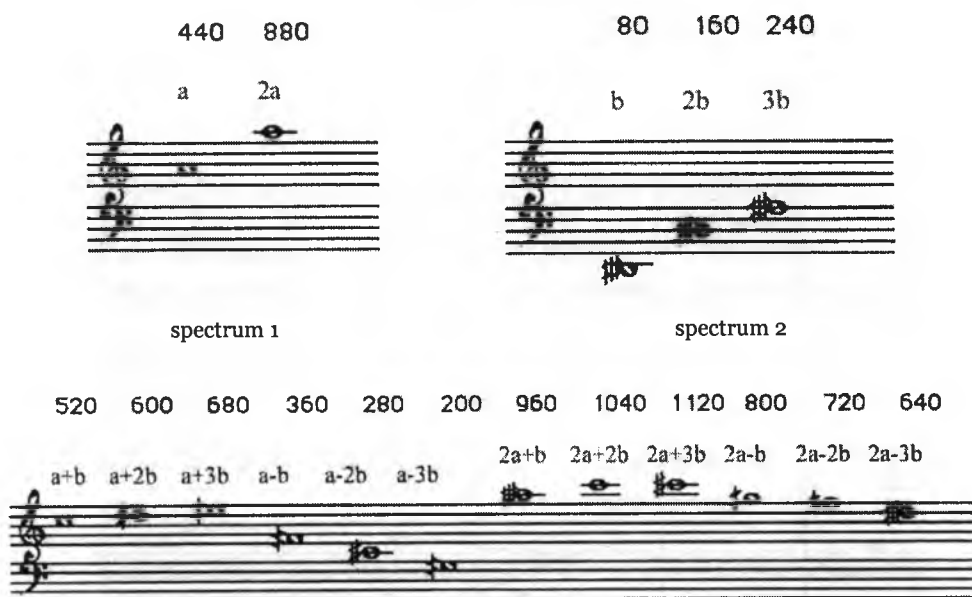
Example 3. Grisey, *Partiels*

It should be clearly emphasised, however, that in reality, due to the specificities of the sounds intoned by conventional instruments, the effect of the compositional procedure described above is not the reconstruction of the spectrum of the sound, but only the obtaining of a multispectral structure – a sound from an instrument has a complex structure and is a harmonic complex tone, whilst a harmonic partial in a spectrum is a simple sound, a pure tone (a single frequency value with a specific amplitude value).

Their knowledge of the nature of the musical sound, its complex structure and its perception, as well as their familiarity with the technology interfering in the shape of this structure, allowed composers of spectral music to exploit not only natural sounds with a specific quantity of harmonics characterised by

a specific frequency and amplitude value and standing in a specific relationship to each other, but also to create new sounds by modifying their structure, that is, the quantity of partials and the value of their physical parameters.

Actions of this type are characteristic of Grisey. In the work described above, Grisey employed, for example, a type of modulation known as ring modulation. Modulation per se is a kind of mutual influence of one sound on another. The physical reality of music – the material and its projection in a musical work – naturally favours the presence of modulation. Two simultaneously generated sounds already modulate one another. The frequency analysis of a sound produced as a result of ring modulation shows that the frequency values of the individual partials of such a sound are produced as a result of the adding and subtracting of the frequency values of particular partials of the sounds which mutually influenced one another<sup>63</sup> (see Example 4<sup>64</sup>).



Example 4.

<sup>63</sup> Joshua Fineberg, 'Guide to the Basic Concepts and Techniques of Spectral Music', *Contemporary Music Review* 19/2 (2000), 81–113.

<sup>64</sup> Repr. after Fineberg, 'Guide', 97.





One of the pages of the score of *Partiels* evinces Grisey's use of ring modulation. Letter annotations by particular notes indicate how Grisey obtained the values of the fundamental partials of sounds with pitches like those written in the score (see Example 5<sup>66</sup>).

In the area of psychic reality, connected with the perception of spectral music, there arise from the 'order of nature' such perceptual phenomena as the physiological mechanism for the transmission of data, the shaping of auditory representations of music referring to the vertical and horizontal organisation of compositions and the emergent expressive features of the perceived music. In the opinions of Grisey cited above, much space was devoted to aspects of listening to, cognising and remembering music. The perception of music was an intrinsic element characterising the composer's creative attitude. To earlier cited reflections on the subject of perception – the fundamental component of the psychic reality of music formed by the listener – it should be added that Grisey did not neglect the question of emotions. He was of the opinion that it is emotions which ultimately create musical form from the perceived reality.<sup>67</sup> Taking the nature of sounds as his starting point, Grisey headed towards the nature of listening, and the effects of this journey are his clearly specified views and their manifestation in composed musical works.

Nevertheless, one cannot overlook the cultural dimension to Grisey's output. Already at the stage of considering the physical foundations to the differentiation of acoustic phenomena, Grisey stressed that different reactions on the part of a listener to perceived musical events were conditioned by our (human) physical diversity, but that the functions which we ascribe to the perceived events in the shaping of the auditory representation result from our cultural context. Grisey left the cultural aspect to listeners.<sup>68</sup>

*Translated by John Comber*

<sup>66</sup> Repr. after Joshua Fineberg, 'Musical Examples', 130.

<sup>67</sup> Grisey, 'Tempus ex machine', 242–243.

<sup>68</sup> 'I personally start more with the physical aspect of things, the physical aspect of sounds, of different spectrums the quality of spectrums. And I leave the rest – it might be most important – but I leave the cultural aspect to the audience.' Bündler, 'Interview with Gérard Grisey'.

